

CLAIMS

1. A power source, power converter, and radio and microwave generator comprising an energy cell for the catalysis of atomic hydrogen to form novel hydrogen species and compositions of matter comprising new forms of hydrogen, an applied magnetic field, and at least one antenna that receives power from a plasma formed by the catalysis of hydrogen.
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- 10 2. The power source, power converter, and radio and microwave generator of claim 2 wherein the electrons and ions of the plasma orbit in a circular path in a plane transverse to the applied magnetic field for sufficient field strength at an ion cyclotron frequency ω_c that is independent of the velocity of the ion.
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- 20 3. The power source, power converter, and radio and microwave generator of claim 1 wherein the ions emit electromagnetic radiation with a maximum intensity at the cyclotron frequency.
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4. The power source, power converter, and radio and microwave generator of claim 1 wherein the electromagnetic radiation emitted from the ions is received by at least one resonant receiving antenna and delivered to an electrical load such as a resistive load or radiated as a source of radio or microwaves.
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5. The compound of claim 1 comprising
- (a) at least one neutral, positive, or negative increased binding energy hydrogen species having a binding energy
- (i) greater than the binding energy of the corresponding ordinary hydrogen species, or
- (ii) greater than the binding energy of any hydrogen species for which the corresponding ordinary hydrogen species is unstable or is not observed because the ordinary hydrogen species' binding energy is less than thermal energies at ambient
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conditions, or is negative; and

(b) at least one other element.

6. A compound of claim 1 characterized in that the increased binding energy hydrogen species is selected from the group consisting of H_n , H_n^- , and H_n^+ where n is a positive integer, with the proviso that n is greater than 1 when H has a positive charge.

10 7. A compound of claim 1 characterized in that the increased binding energy hydrogen species is selected from the group consisting of (a) hydride ion having a binding energy that is greater than the binding of ordinary hydride ion (about 0.8 eV) for $p=2$ up to 23 in which the binding energy is represented by

$$15 \text{ Binding Energy} = \frac{\hbar^2 \sqrt{s(s+1)}}{8\mu_e a_0^2 \left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^2} - \frac{\pi \mu_0 e^2 \hbar^2}{m_e^2 a_0^3} \left(1 + \frac{2^2}{\left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^3} \right)$$

where p is an integer greater than one, $s=1/2$, π is pi, \hbar is Planck's constant bar, μ_0 is the permeability of vacuum, m_e is the mass of the electron, μ_e is the reduced electron mass, a_0 is the Bohr radius, and e is the elementary charge; (b) hydrogen atom having a binding energy greater than about 13.6 eV; (c) hydrogen molecule having a first binding energy greater than about 15.5 eV; and (d) molecular hydrogen ion having a binding energy greater than about 16.4 eV.

25 8. A compound of claim 7 characterized in that the increased binding energy hydrogen species is a hydride ion having a binding energy of about 3.0, 6.6, 11.2, 16.7, 22.8, 29.3, 36.1, 42.8, 49.4, 55.5, 61.0, 65.6, 69.2, 71.5, 72.4, 71.5, 68.8, 64.0, 56.8, 47.1, 34.6, 19.2, or 0.65 eV.

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9. A compound of claim 8 characterized in that the increased binding energy hydrogen species is a hydride ion having the binding energy:

$$\text{Binding Energy} = \frac{\hbar^2 \sqrt{s(s+1)}}{8\mu_e a_0^2 \left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^2} - \frac{\pi \mu_0 e^2 \hbar^2}{m_e^2 a_0^3} \left(1 + \frac{2^2}{\left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^3} \right)$$

where p is an integer greater than one, $s=1/2$, π is pi, \hbar is Planck's constant bar, μ_0 is the permeability of vacuum, m_e is the mass of the electron, μ_e is the reduced electron mass, a_0 is the Bohr radius, and e is the elementary charge.

10. A compound of claim 1 characterized in that the increased binding energy hydrogen species is selected from the group consisting of

(a) a hydrogen atom having a binding energy of about $\frac{13.6 \text{ eV}}{\left(\frac{1}{p}\right)^2}$ where p is an integer,

(b) an increased binding energy hydride ion (H^-) having a binding energy of about

$$\frac{\hbar^2 \sqrt{s(s+1)}}{8\mu_e a_0^2 \left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^2} - \frac{\pi \mu_0 e^2 \hbar^2}{m_e^2 a_0^3} \left(1 + \frac{2^2}{\left[\frac{1 + \sqrt{s(s+1)}}{p} \right]^3} \right) \text{ where } s=1/2, \pi \text{ is}$$

pi, \hbar is Planck's constant bar, μ_0 is the permeability of vacuum, m_e is the mass of the electron, μ_e is the reduced electron mass, a_0 is the Bohr radius, and e is the elementary charge;

(c) an increased binding energy hydrogen species $H_i^+(1/p)$;

(d) an increased binding energy hydrogen species trihydrino molecular ion, $H_3^+(1/p)$, having a binding energy of about $\frac{22.6}{\left(\frac{1}{p}\right)^2} \text{ eV}$ where p is an integer,

(e) an increased binding energy hydrogen molecule having a binding energy of about $\frac{15.5}{\left(\frac{1}{p}\right)^2} \text{ eV}$; and

(f) an increased binding energy hydrogen molecular ion

with a binding energy of about $\frac{16.4}{\left(\frac{1}{p}\right)^2}$ eV.